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(54) **NETWORK ENABLED GARDENING WITH A REMOTELY CONTROLLABLE POSITIONING EXTENSION**

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CPC ***A01G 25/09*** (2013.01); ***A01G 25/16*** (2013.01); ***G05D 1/0038*** (2013.01); *G05D 2201/0201* (2013.01)

(58) **Field of Classification Search**

None

See application file for complete search history.

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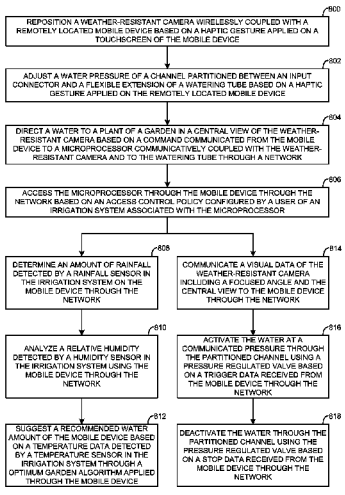
(57) **ABSTRACT**

A watering apparatus and associated methods and systems to enable networked gardening with a remotely controllable positioning extension are disclosed. In one embodiment, the watering apparatus includes a weather-resistant housing to encompass a micro-processor and a communications circuitry. In addition, the watering apparatus includes a weather-resistant camera communicatively coupled with the weather resistant housing through the communications circuitry. An input connector directs water through a partitioned channel from the weather-resistant housing responsive to a signal from the microprocessor through a pressure regulated valve. The watering apparatus is connected to a flexible extension coupled with the weather-resistant housing to automatically transport the water through the partitioned channel to a desired location within a central view of a focused angle of the weather-resistant camera. Further, the watering apparatus may be accessed through a mobile device through a network based on an access control policy configured by a user of the watering apparatus.

11 Claims, 8 Drawing Sheets



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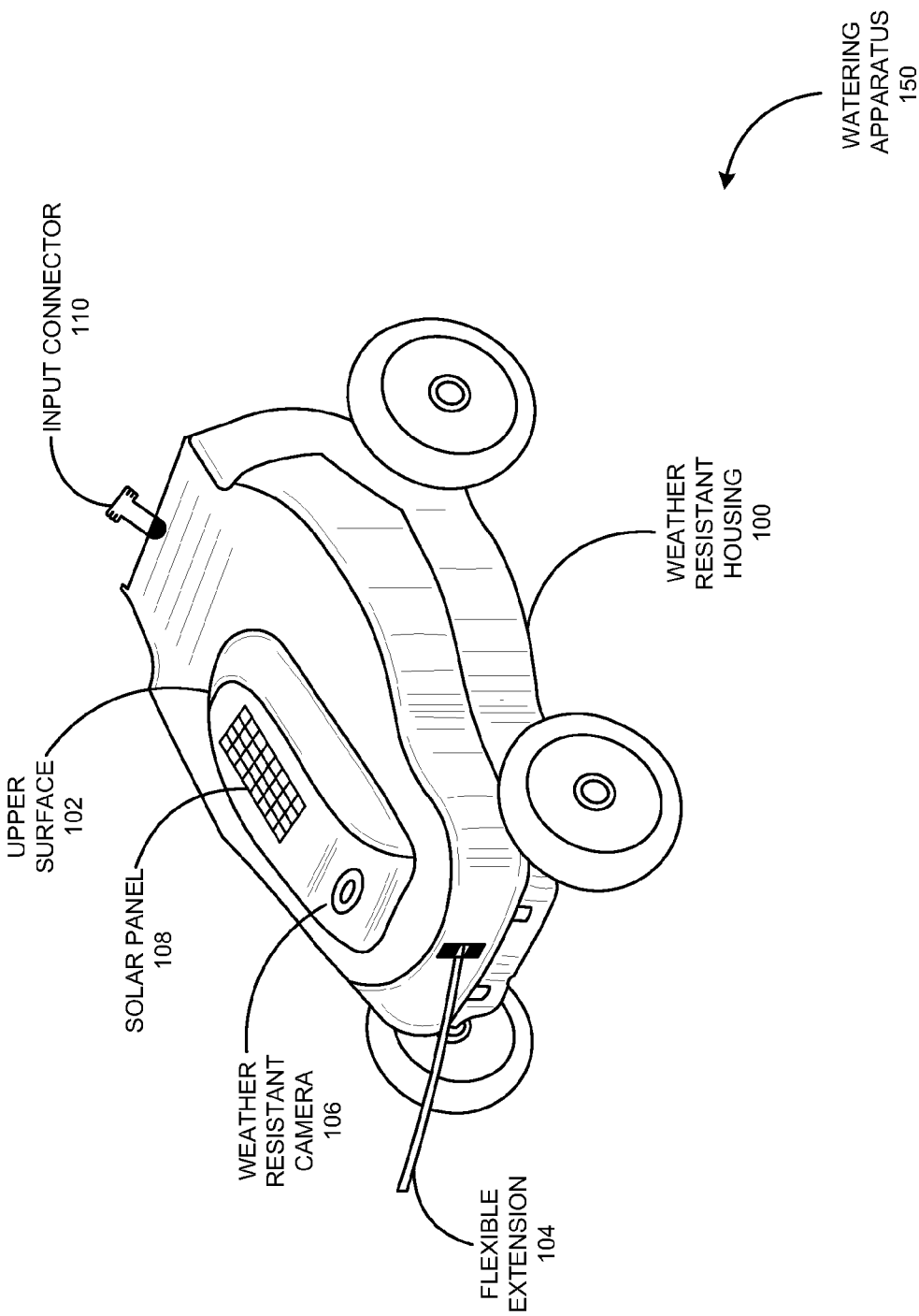
WATERING APPARATUS 150
INPUT CONNECTOR 110
WEATHER RESISTANT HOUSING 100
UPPER SURFACE 102
SOLAR PANEL 108
WEATHER RESISTANT CAMERA 106
FLEXIBLE EXTENSION 104

FIGURE 1

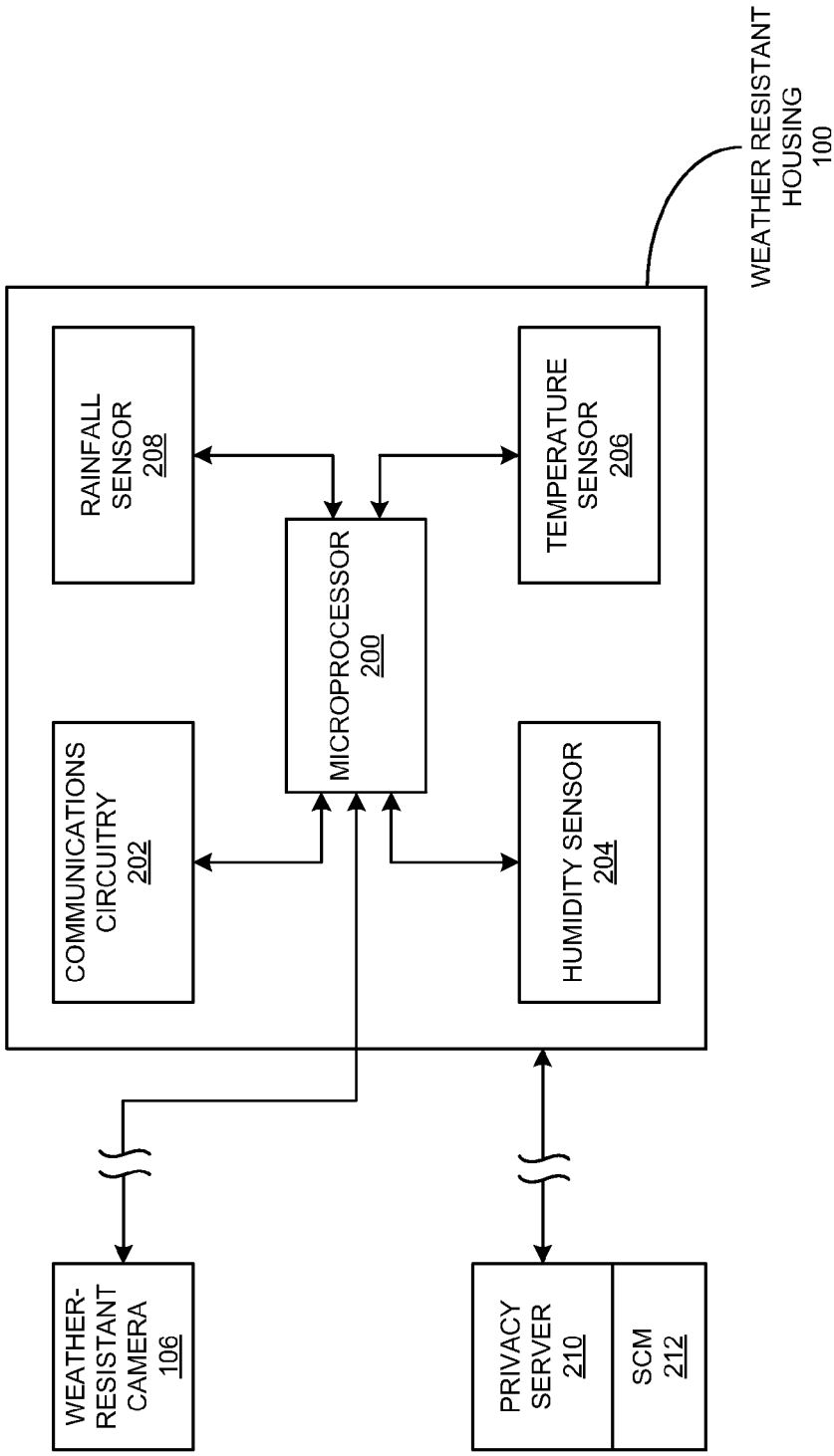
WEATHER RESISTANT HOUSING 100
RAINFALL SENSOR 208
TEMPERATURE SENSOR 206
MICROPROCESSOR 200
COMMUNICATIONS CIRCUITRY 202
HUMIDITY SENSOR 204
WEATHER-RESISTANT CAMERA 106
PRIVACY SERVER 210
SCM 212

FIGURE 2

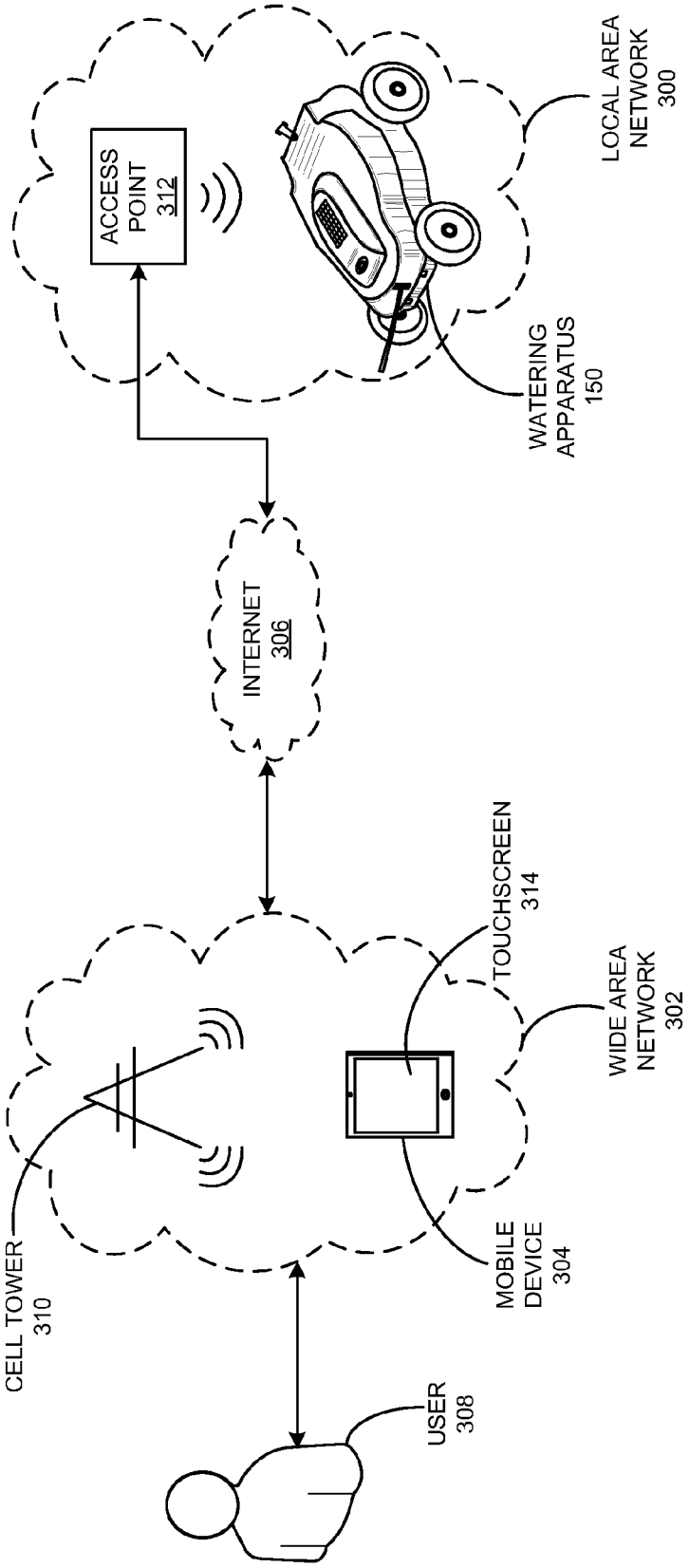
LOCAL AREA NETWORK 300
ACCESS POINT 312
WATERING APPARATUS 150
INTERNET 306
TOUCHSCREEN 314
WIDE AREA NETWORK 302
CELL TOWER 310
MOBILE DEVICE 304
USER 308

FIGURE 3

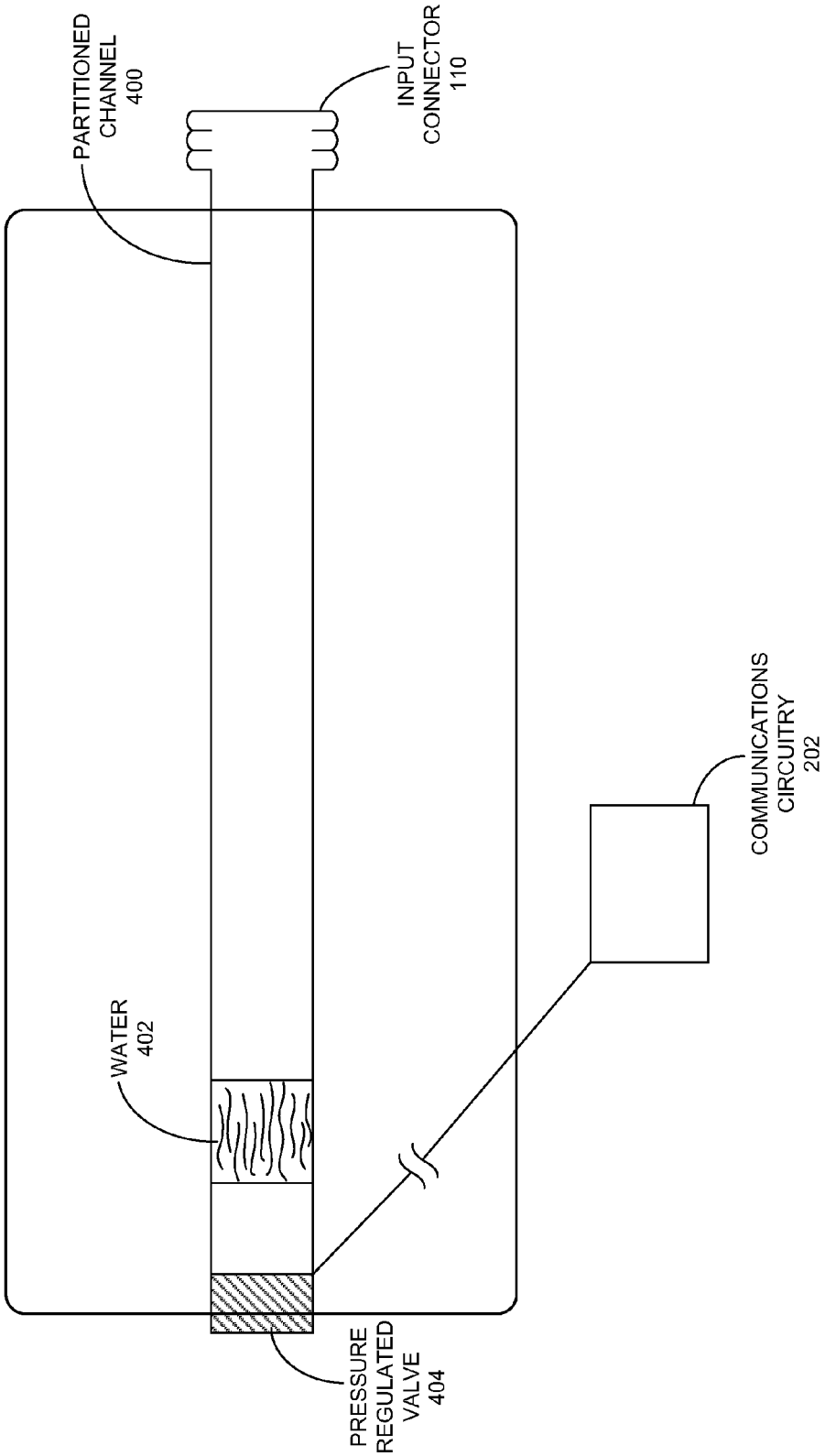
PARTITIONED CHANNEL 400
INPUT CONNECTOR 110
COMMUNICATIONS CIRCUITRY 202
WATER 402
PRESSURE REGULATED VALVE 404

FIGURE 4

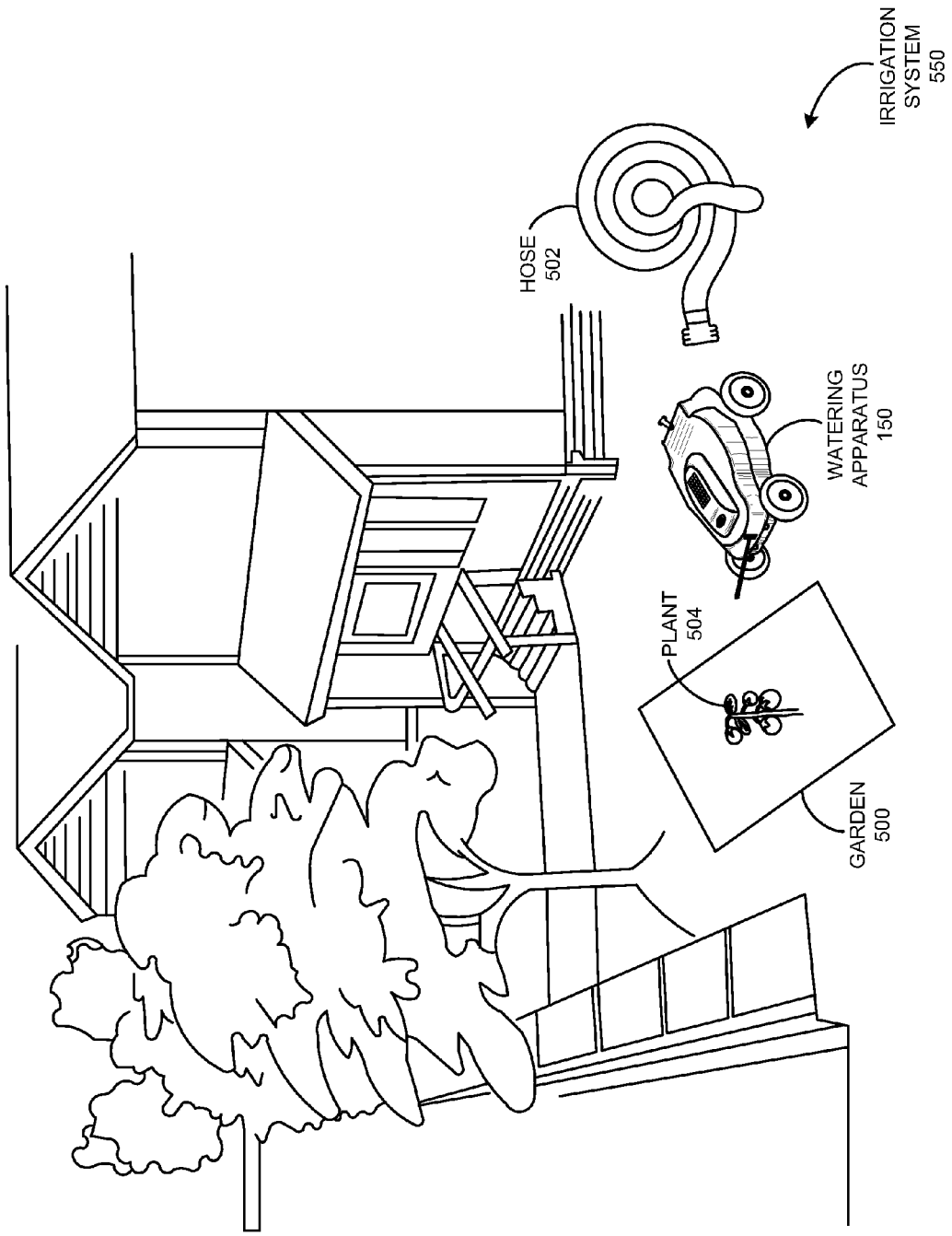
IRRIGATION SYSTEM 550
HOSE 502
WATERING APPARATUS 150
PLANT 504
GARDEN 500

FIGURE 5

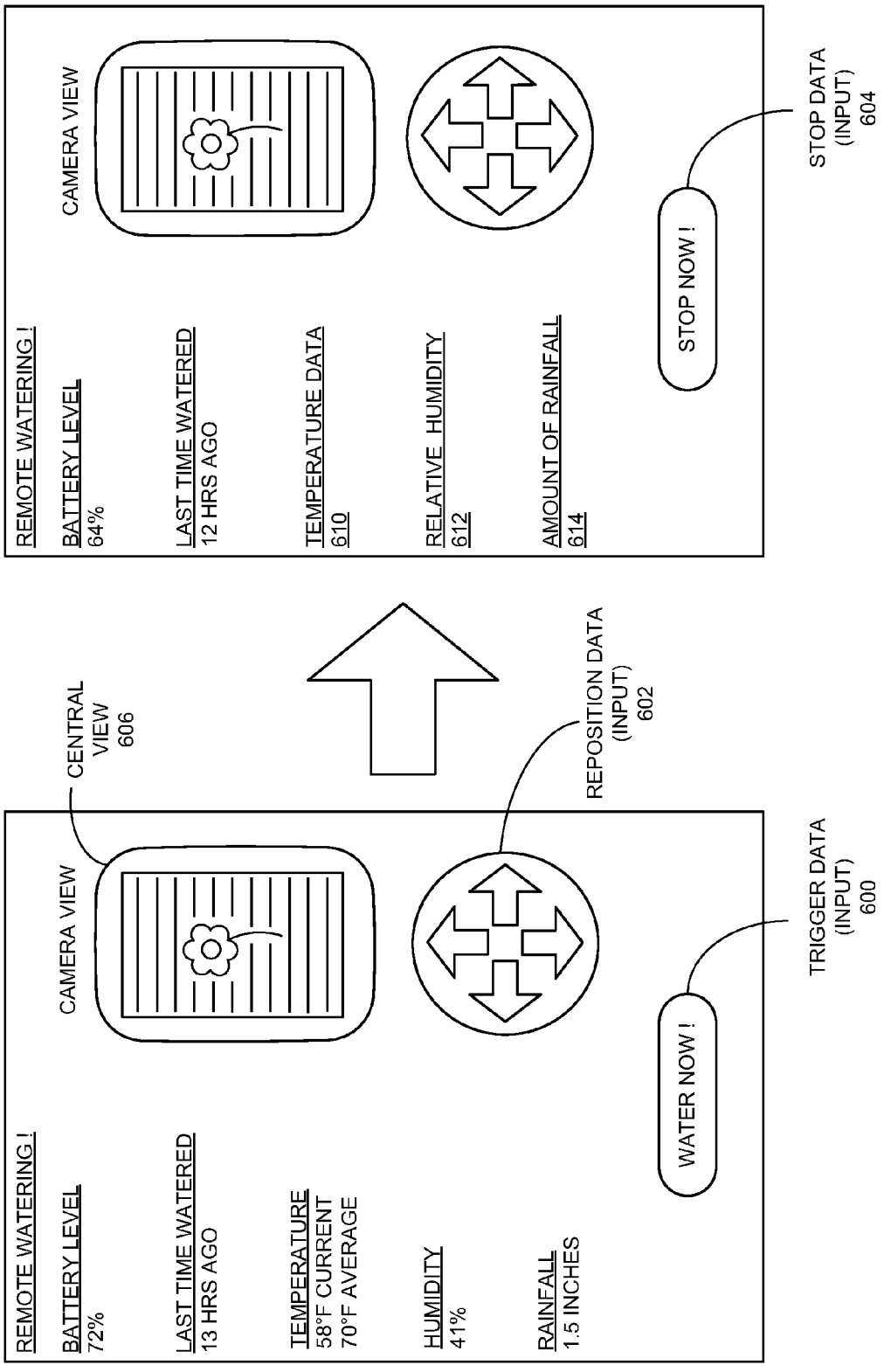
REMOTE WATERING !
BATTERY LEVEL
72%
LAST TIME WATERED
13 HRS AGO
TEMPERATURE
58°F CURRENT
70°F AVERAGE
HUMIDITY
41%
RAINFALL
1.5 INCHES
CAMERA VIEW
CENTRAL VIEW 606
WATER NOW !
TRIGGER DATA (INPUT) 600
REPOSITION DATA (INPUT) 602
REMOTE WATERING !
BATTERY LEVEL
64%
LAST TIME WATERED
12 HRS AGO
TEMPERATURE DATA
610
RELATIVE HUMIDITY
612
AMOUNT OF RAINFALL
614
CAMERA VIEW
STOP NOW !
STOP DATA (INPUT) 604

FIGURE 6

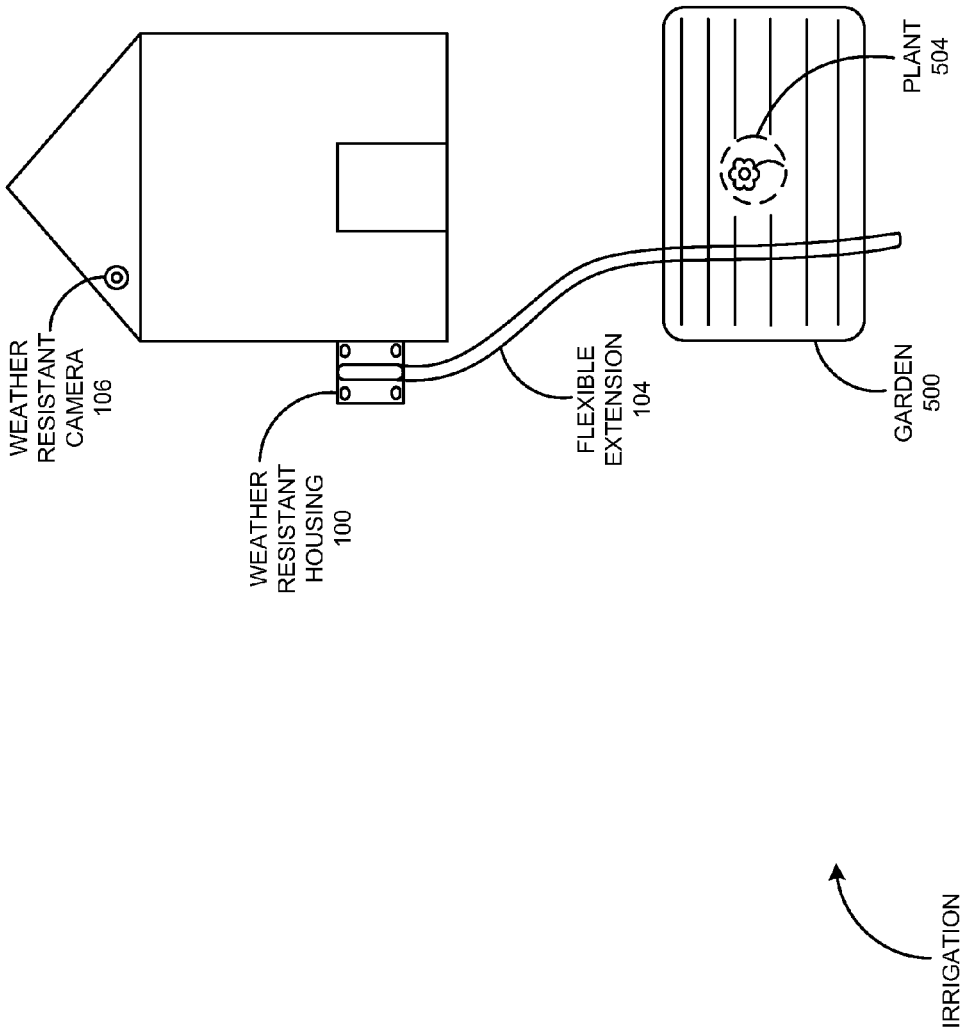
WEATHER RESISTANT CAMERA 106
WEATHER RESISTANT HOUSING 100
FLEXIBLE EXTENSION 104
PLANT 504
GARDEN 500
IRRIGATION SYSTEM 550

FIGURE 7

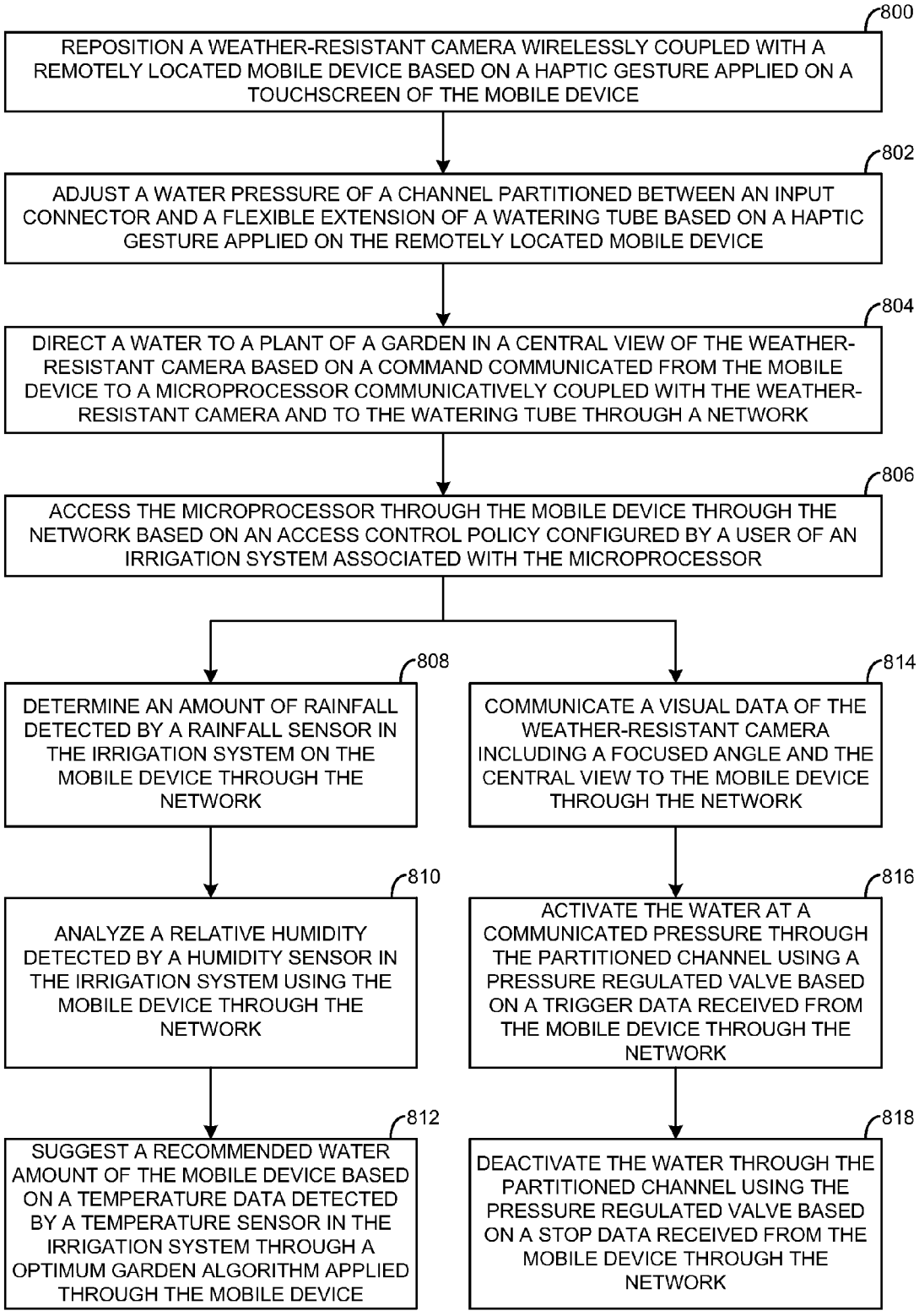
800
REPOSITION A WEATHER-RESISTANT CAMERA WIRELESSLY COUPLED WITH A REMOTELY LOCATED MOBILE DEVICE BASED ON A HAPTIC GESTURE APPLIED ON A TOUCHSCREEN OF THE MOBILE DEVICE
802
ADJUST A WATER PRESSURE OF A CHANNEL PARTITIONED BETWEEN AN INPUT CONNECTOR AND A FLEXIBLE EXTENSION OF A WATERING TUBE BASED ON A HAPTIC GESTURE APPLIED ON THE REMOTELY LOCATED MOBILE DEVICE
804
DIRECT A WATER TO A PLANT OF A GARDEN IN A CENTRAL VIEW OF THE WEATHER-RESISTANT CAMERA BASED ON A COMMAND COMMUNICATED FROM THE MOBILE DEVICE TO A MICROPROCESSOR COMMUNICATIVELY COUPLED WITH THE WEATHER-RESISTANT CAMERA AND TO THE WATERING TUBE THROUGH A NETWORK
806
ACCESS THE MICROPROCESSOR THROUGH THE MOBILE DEVICE THROUGH THE NETWORK BASED ON AN ACCESS CONTROL POLICY CONFIGURED BY A USER OF AN IRRIGATION SYSTEM ASSOCIATED WITH THE MICROPROCESSOR
808
DETERMINE AN AMOUNT OF RAINFALL DETECTED BY A RAINFALL SENSOR IN THE IRRIGATION SYSTEM ON THE MOBILE DEVICE THROUGH THE NETWORK
810
ANALYZE A RELATIVE HUMIDITY DETECTED BY A HUMIDITY SENSOR IN THE IRRIGATION SYSTEM USING THE MOBILE DEVICE THROUGH THE NETWORK
812
SUGGEST A RECOMMENDED WATER AMOUNT OF THE MOBILE DEVICE BASED ON A TEMPERATURE DATA DETECTED BY A TEMPERATURE SENSOR IN THE IRRIGATION SYSTEM THROUGH A OPTIMUM GARDEN ALGORITHM APPLIED THROUGH THE MOBILE DEVICE
814
COMMUNICATE A VISUAL DATA OF THE WEATHER-RESISTANT CAMERA INCLUDING A FOCUSED ANGLE AND THE CENTRAL VIEW TO THE MOBILE DEVICE THROUGH THE NETWORK
816
ACTIVATE THE WATER AT A COMMUNICATED PRESSURE THROUGH THE PARTITIONED CHANNEL USING A PRESSURE REGULATED VALVE BASED ON A TRIGGER DATA RECEIVED FROM THE MOBILE DEVICE THROUGH THE NETWORK
818
DEACTIVATE THE WATER THROUGH THE PARTITIONED CHANNEL USING THE PRESSURE REGULATED VALVE BASED ON A STOP DATA RECEIVED FROM THE MOBILE DEVICE THROUGH THE NETWORK

FIGURE 8

NETWORK ENABLED GARDENING WITH A REMOTELY CONTROLLABLE POSITIONING EXTENSION

FIELD OF TECHNOLOGY

This disclosure relates generally to a horticultural system, and in one exemplary embodiment, to a system, method, and apparatus of network enabled gardening with a remotely controllable positioning extension.

BACKGROUND

A family may wish to grow vegetables and flowering plants inside and/or outside a home. For example, the family may create a garden of vegetables and flowering plants in their front yard and/or in a greenhouse area of their kitchen window. A family member (e.g., a child, a parent) may love gardening and flowers, and may prefer manually watering the garden because it may feel more natural, satisfying, and/or rewarding than through a timed irrigation system. Furthermore, the family member may prefer assessing temperature, sunshine, wind, and/other environmental conditions before deciding whether to manually water their garden.

The family may travel on weekends often and may not be at home on a frequent basis. In addition, the family may lead busy schedules, governed by school, work, and/or family activities (e.g., miniature golf, after school art programs, choir, cherry picking, weekend getaways, Church). In addition, the family may remember to water their garden of vegetables when physically distant from the garden, for example, while at school, while on a weekend getaway, etc. However, because the garden may not be within an immediate proximity, the family may not be able to water the garden. Worse yet, the family may forget to water the garden after returning home. During these times, at least one member of the family may have a mobile device and/or Internet connectivity. However, there may not be anyone at the home where the garden is located to manually telephone in a request for watering. As a result, the garden of vegetables and flowering plants may not receive adequate water supply and/or beneficial fertilizers regularly. As such, fewer flowers and vegetables may grow in the garden than would otherwise if the garden were to receive adequate water and nutrients.

SUMMARY

A watering apparatus and associated methods and systems to enable networked gardening with a remotely controllable positioning extension are disclosed. In one aspect, the watering apparatus includes a weather-resistant housing to encompass a micro-processor and a communications circuitry. In addition, the watering apparatus includes a weather-resistant camera communicatively coupled with the weather resistant housing through the communications circuitry. An input connector directs water through a partitioned channel from the weather-resistant housing responsive to a signal from the microprocessor through a pressure regulated valve. The watering apparatus is connected to a flexible extension coupled with the weather-resistant housing to automatically transport the water directed through the partitioned channel to a desired location within a central view of a focused angle of the weather-resistant camera.

The watering apparatus may wirelessly register a public and/or private Internet Protocol (IP) address with a local access point of a network through the communications circuitry. Further, the watering apparatus may be accessed through a mobile device through a network based on an access control policy configured by a user of the watering apparatus. The watering apparatus may also communicate a visual data of the weather-resistant camera including the focused angle and/or the central view to the mobile device through the network. The weather-resistant camera may be repositioned based on a reposition data received from the mobile device through the network when a haptic gesture is applied on a touchscreen of the mobile device. The watering apparatus may activate the water at a communicated pressure through the partitioned channel using the pressure regulated valve based on a trigger data received from the mobile device through the network. The watering apparatus may deactivate the water through the partitioned channel using the pressure regulated valve based on a stop data received from the mobile device through the network.

Further, the watering apparatus may include a rainfall sensor in the weather-resistant housing to communicate an amount of rainfall detected by the watering apparatus to the mobile device through the network. The watering apparatus may also include a humidity sensor in the weather-resistant housing to communicate a relative humidity detected by the watering apparatus to the mobile device through the network. In addition, the watering apparatus may include a temperature sensor in the weather-resistant housing to communicate a temperature data to the mobile device through the network.

Further, the watering apparatus may comprise a solar panel affixed on the upper surface of the watering apparatus to power circuitry in the weather-resistant housing.

In another aspect, an irrigation system includes a weather-resistant housing encompassing a micro-processor and a communications circuitry, and a weather-resistant camera communicatively coupled with the weather resistant housing through the communications circuitry. The irrigation system also includes a mobile device to reposition the weather-resistant camera to direct water to a plant of a garden in a central view of the weather-resistant camera based on commands communicated from the mobile device to the microprocessor through a network.

Further, the irrigation system may include an input connector to direct the water through a partitioned channel from the weather-resistant housing responsive to a signal from the microprocessor through a pressure regulated valve. The irrigation system may also include a flexible extension coupled with the weather-resistant housing to automatically transport the water directed through the partitioned channel to a desired location, as designated by a user using the mobile device.

In yet another aspect, an irrigation method may include repositioning a weather-resistant camera wirelessly coupled with a remotely located mobile device based on a haptic gesture applied on a touchscreen of the mobile device. The irrigation method further include adjusting a water pressure of a partitioned channel between an input connector and a flexible extension of a watering tube based on a haptic gesture applied on the remotely located mobile device. Water is directed to a plant of a garden in a central view of the weather-resistant camera based on a command communicated from the mobile device to a microprocessor communicatively coupled with the weather-resistant camera and to the watering tube through a network.

The methods, systems, and apparatuses disclosed herein may be implemented in any means for achieving various aspects, and may be executed in a form of a machine-

readable medium embodying a set of instructions that, when executed by a machine, cause the machine to perform any of the operations disclosed herein. Other features will be apparent from the accompanying drawings and from the detailed description that follows.

BRIEF DESCRIPTION OF THE DRAWINGS

Example embodiments are illustrated by way of example and not limitation in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

FIG. **1** illustrates a watering apparatus having a weather-resistant camera, according to one or more embodiments.

FIG. **2** is a schematic representation of the internal circuitry of the watering apparatus of FIG. **1**, according to one or more embodiments.

FIG. **3** is a network view of communication with the watering apparatus of FIG. **1** in a local area network through a mobile device in a wide area network, according to one or more embodiments.

FIG. **4** is a flow diagram illustrating a pressurize regulated valve that can control water through a portioned channel of the watering apparatus of FIG. **1**, according to one or more embodiments.

FIG. **5** illustrates water directed to a plant of a garden in a central view of the weather-resistant camera of FIG. **1** based on a command communicated from the mobile device of FIG. **3** to a microprocessor communicatively coupled with the weather-resistant camera and to the watering tube through the networks described in FIG. **3**, according to one or more embodiments.

FIG. **6** is a user interface view of an operation of the mobile device in which various command can be communicated from the mobile device of FIG. **3** to the watering apparatus of FIG. **1**, according to one or more embodiments.

FIG. **7** illustrates an alternative embodiment in which an irrigation system is modified to enable the various operations described in FIGS. **5** and **6** between the mobile device of FIG. **3** and plants in a garden of a personal dwelling, according to one or more embodiments.

FIG. **8** is a flowchart illustrating various operations of the watering apparatus of FIG. **1** using the mobile device of FIG. **3**, according to one or more embodiments.

Other features of the present embodiments will be apparent from the accompanying drawings and from the detailed description that follows.

DETAILED DESCRIPTION

Example embodiments, as described below, may be used to provide a method, a device and/or a system to enable networked gardening with a remotely controllable positioning extension. Although the present embodiments have been described with reference to specific example embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the various embodiments.

FIG. **1** shows a watering apparatus **150**. The watering apparatus **150** directs a water **402** to the desired location, according to one or more embodiments. The watering apparatus **150** is communicatively coupled to an access point **312** in a local area network (LAN) **300**. In one or more embodiments, watering apparatus **150** may comprise of a weather resistant housing **100**.

Weather resistant housing **100** may be made of a plastic (e.g. high-density polyethylene) other forms of plastic are within the scope of the exemplary embodiments discussed herein. The weather resistant housing **100** may provide an aesthetically appealing look to the watering apparatus **150** and/or protect the internal pieces of the watering apparatus **150**. Further, the weather resistant housing may be affixed to an upper surface **102** and an input connector **110**.

The upper surface **102** may be made of a plastic (e.g. high-density polyethylene) as well. Upper surface **102** may provide a platform to mount a solar panel **108** and/or a weather resistant camera **106**. The upper surface **102** may be affixed to the topside of the watering apparatus **150**.

A flexible extension **104** may be protruding from the weather resistant housing, angled away from the ground. The flexible extension **104** may be made of a water transportation pipe and/or hose (e.g. rubber hose, polyvinyl chloride (PVC) pipe, etc.). Other forms of water transportation hoses are within the scope of the exemplary embodiments discussed herein. The flexible extension may connect to a pressure regulated valve **404**. The goal of the flexible extension (piece **104**) may be to rotate around a pivot inside a cavity of the water resistant housing **100** to enable the watering apparatus **150** to automatically position the watering apparatus near a root of a plant of a garden to be watered through the Internet. For example, a WiFi or 4G cellular connection to which the watering apparatus is coupled may enable the watering apparatus **100** to reposition its piece **104** based on instructions received from a mobile iPhone and/or Android application communicatively coupled with the watering apparatus **150** through a neighborhood social network (e.g., Fatdoor).

The weather resistant camera **106** may be located on the front of the upper surface **102**. The weather resistant camera **106** may be mounted as to provide a clear view of what is in front of the apparatus **150**. The weather resistant camera **106** may consist of a camera module encompassed in an IP66 rated plastic enclosure with a polycarbonate lens cover. Other forms of weather resistant camera housing are within the scope of the exemplary embodiments discussed herein. The weather resistant camera **106** may communicate with a microprocessor **200** to provide a visual data in a central view **606** to a user **308** of a mobile device **304** (to be discussed with regards to FIG. **2** and FIG. **3**).

According to one or more embodiments, solar panel **108** may be affixed to the topside of the upper surface **102**. The solar panel **108** may be comprised of wafer based crystalline silicon cells, wherein the solar panel **108** generates electricity through the photovoltaic effect. Other forms of using transferring solar radiation to useable energy by the watering apparatus **150** are within the scope of the exemplary embodiments discussed herein. The solar panel **108** may be used to provide electricity to the entire apparatus, according to one or more embodiments.

According to one or more embodiments, the input connector **110** may be used to connect to a hose **502** to the watering apparatus **150**. The input connector may comprise of a ⅜" brass hose female adapter. The hose **502** may be used so that existing plumbing, associated with a home, a garden, etc., can be utilized. The hose may be made of a rubber material or any other common water transportation materials.

According to one or more embodiments, FIG. **2** illustrates a schematic view of the internal circuitry of the watering apparatus **150** in one or more embodiments. In one or more embodiments, the microprocessor **200** may consist of a programmable integrated circuit or multiple programmable integrated circuits. The integrated circuit may take digital data (e.g. a stop data **604**, a trigger data **600**, a reposition data

602) and/or provide a certain result as processed according to the instructions stored in the memory. The microprocessor may be communicatively coupled to a communications circuitry **202**, a rainfall sensor **208**, a humidity sensor **204**, a temperature sensor **206**, and the weather resistant camera **106**. Microprocessor **200** may be located within the weather resistant housing **100**.

In one or more embodiments, the communications circuitry **202** may consist of a wireless network interface controller. This may enable communication with mobile devices that wirelessly control the watering apparatus **150** through a mobile phone through a WiFi hotspot in the home and/or a cellular network. In one or more embodiments, the communications circuitry **202** may couple with a neighborhood social network, such as Fatdoor and/or Nextdoor so that a verified community of neighbors can control the watering apparatus using various circuitries and modules of the watering apparatus **150**. When the watering apparatus **150** is coupled with the neighborhood social network (e.g., in which individual users verify a present geo-spatial location associate with each other's homes using a phone and/or a postcard mailed to home verification system), the watering apparatus **150** may develop additional functionality. For example, in one embodiment, a group of neighbors living around a specific neighborhood (e.g., each neighbor verified as living in that neighborhood) may then water a community garden and/or may take turns watering a single garden. This way, a community may govern the distribution of water in its own gardens based on a desire of the residents confirmed to live in that neighborhood through the neighborhood social network. The communications circuitry **202** may be used to connect the watering apparatus **150** to the access point **312**. The communications circuitry **202** may be connected to the microprocessor **200** and/or communicatively coupled with the access point **312**. The communications circuitry **202** may be housed within the weather resistant housing **100** of the watering apparatus **150**.

The humidity sensor **204** may be located inside of the weather resistant housing **100** and communicatively coupled with the microprocessor **200**. The humidity sensor **204** may provide the user **308** of the mobile device **304** a relative humidity **612** of the area the watering apparatus **150** is located at. The humidity sensor **204** may be any of the following electronic hygrometers, including but not limited to a chilled mirror dew point hygrometer, a capacitive humidity sensor, and/or a resistive humidity sensor. A chilled mirror dew point hygrometer use a temperature controlled mirror to maintain equilibrium between evaporation and condensation using optoelectronics and therefore, measuring the dew point which can be used to figure out the relative humidity **612**. A capacitive humidity sensor measures the relative humidity **612** by detecting changes as the polymer or metal oxide dielectric constant is greatly affected by differences in humidity. Resistive humidity sensors work by measuring differences in electric resistance as the material's resistance changes with varying humidity. Other forms of relative humidity **612** measurement devices are within the scope of the exemplary embodiments discussed herein. The temperature sensor **206** may be a thermistor. A thermistor is a resistor, wherein the resistance is greatly affected by the change in temperature. The temperature sensor **206** may be used to provide a temperature data **610** of the area where the watering apparatus **150** is located. The temperature sensor **206** may be communicatively coupled to the microprocessor **200** and/or enclosed in the weather resistant housing **100** of the watering apparatus **150**. Other forms of temperature measurement devices are within the scope of the exemplary embodiments discussed herein. The rainfall sensor **208** may be located in the weather resistant housing **100** of the watering apparatus **150**. The rainfall sensor **208** may be communicatively coupled to the microprocessor **200**. The rainfall sensor **208** may provide a data about the amount of rainfall **614** in a certain time period that occurred in the area of the watering apparatus **150**. The rainfall sensor may be any of the following including but not limited to, a standard rain gauge, a weight precipitation gauge, a tipping bucket rain gauge, and/or an optical rain gauge. A standard rain gauge consists of two graduated cylinders, one large one with a smaller one inside. A weight precipitation gauge determines the amount of rainfall **614** by weighing the collected water. A tipping bucket rain gauge collects rainwater on a lever, and once a predetermined about has been collected the lever will tip, dump the water, and activate a switch, which is then recorded electronically. An optical rain gauge uses a laser diode and a photo transistor detector, such that when enough water is collected to form a drop, the drop falls between the laser diode and photo transistor detector. The scattering affect is counted and a rainfall data is derived from such information. Other forms of rainfall measurement devices are within the scope of the exemplary embodiments discussed herein.

A privacy server **210** may coupled with the weather resistant housing **100** of the watering apparatus **150** through a network (e.g., an internet) to apply an address verification algorithm associated with each user of the online community to verify that each user lives at a residence associated with a claimable residential address of an online community formed through a social community module **212** of the privacy server **210** using the processor and the memory. The privacy server **210** may generate a latitudinal data and a longitudinal data associated with each claimable residential address of the online community associated with each user of the online community. The privacy server **210** may automatically determine a set of access privileges in the online community associated with each user of the online community by constraining access in the online community based on a neighborhood boundary determined using a Bezier curve algorithm of the privacy server. The watering apparatus **150** may be constrained in accessibility only to those neighbors that are verified to live in a neighborhood boundary in which the watering apparatus is located. The watering apparatus may function as a community resource in the online community such that neighbors verified as living inside the neighborhood boundaries and which are part of a gardening club of the online community can collectively take turns watering a community garden of the online community.

FIG. **3** illustrates a network view, showing how the user **308** may interact with the watering apparatus **150** remotely in one or more embodiments. In one or more embodiments, the LAN **300** may be used such that the watering apparatus **150** may receive and/or send information through an Internet **306** using the nearby access point **312**. A LAN is a local area network that interconnects computers. LAN's are most commonly built using Ethernet wires and/or WiFi®. For example, an Internet modem may be communicatively coupled to a wireless router, which is comprised of an access point **312**, which allows the watering apparatus **150** to be connected to the Internet. A wide area network (WAN) **302** is a network that is used to transmit data over long distances and between localized networks such as, local area networks, metropolitan area networks, campus area networks, etc. The WAN **302** may allow the mobile device **304** to use a cell tower **310** to connect to the Internet **306**. The Internet

306 is a global network of computer networks using the Transmission Control Protocol/Internet Protocol. The Internet 306 may allow communication between two devices in separate LAN's, WAN's, etc. Other forms of data transfers are within the scope of the exemplary embodiments discussed herein

A mobile device 304, such as a cell phone or tablet, is a personal handheld computing device. Other forms of mobile computer not mentioned herein are within the scope of the exemplary embodiments discussed herein. In one or more embodiments, the mobile device 304 may allow a user 308 to access the watering apparatus 150 remotely, using some sort of network communications. For example, the mobile device 304 may connect to the Internet 306 via the cell tower 310, which allows the mobile device 304 to access the LAN 300 that the watering apparatus 150 is connected to. The cell tower 310 comprises of electronic communication circuits and antennas, which are placed in a high place, usually a radio mast, a tower, or building. A cell tower is one cell in a network of cell towers to make up a cellular network. The access point 312 is a device that allows a wireless device to access a wired network. This is often housed in a router, which is often used in a LAN. In one or more embodiments the access point 312 may be used to allow the watering apparatus 150 to connect to the Internet 306 wirelessly.

A touchscreen 314 is a visual display that a user 308 can use to see information sent to the mobile device 304. A user 308 may also be able to apply haptic gestures to the touchscreen 314 for a desired action. FIG. 6 illustrates two user interface views that the user 308 would see on the touchscreen 314 of the mobile device 304 in one or more embodiments. In one or more embodiments, user 308 may be able to apply a haptic gesture in such a way as to send the trigger data 600, the reposition data 602, and/or the stop data 604. The trigger data 600 may cause the water 402 to begin to flow and spray from the flexible extension 104. The reposition data 602 may allow the user to move the watering apparatus 150 to a more desired location. This may be used to effectively water a spot that was previously unreachable and/or neglected. The stop data 604 may cause the water 402 to stop flowing and cease the watering process. The user may also be able to see the central view 606 of the watering apparatus 150. The touchscreen 314 may show a central view 606 as captured by the weather resistant camera 106.

FIG. 4 illustrates a flow diagram of the water 402 through the apparatus in one or more embodiments. In one or more embodiments, the water may pass through the input connector 110, then a partitioned channel 400, through the pressure regulated valve 404, and/or out the flexible extension 104. The partitioned channel 400 may comprise of a hose with connector on one end to fit on the input connector 110. The partitioned channel 400 may be made of a rubber or PVC piping type material. The partitioned channel 400 may feed the water 402 to the pressure regulated valve 404. The partitioned channel 400 may be located within the weather resistant housing 100. In one or more embodiments, the pressure regulated valve 404 may be used to control the flow of water sprayed from the watering apparatus 150. The pressure regulated valve 404 may be controlled via an electrical signal transmitted by the microprocessor 200. The pressure regulated valve 404 may connect the flexible extension 104 and the partitioned channel 400. The pressure regulated valve 404 may be housed in the weather resistant housing 100.

FIG. 5 illustrates an irrigation system 550 in one or more embodiments. In one or more embodiments, irrigation system 550 may comprise of a garden 500 with a plant(s) 504, a watering apparatus 150, and/or a hose 502. The hose 502 may be used so that the watering apparatus 150 can receive water directly from the existing plumbing system. The hose 502 may be able to be directly coupled through the input connector 110 on the backside of the watering apparatus 150. A garden is usually a planned space set aside for the cultivation of plants. The watering apparatus 150 may be able to target a specific plant 504 in the garden 500 to direct the water 402 at.

In one embodiment the watering apparatus 150 may be used to direct the water 402 to the plant 504. The user 308 may send the reposition data 602, the trigger data 600, and/or the stop data 604 to the watering apparatus 150 by a mobile device via a signal through a network. The data may be communicated via radio waves, by sending a data signal from the mobile device 304 to the cell tower 310. The cell tower 310 may then relay that signal via the Internet 306 to an access point 312 of the LAN 300, of which the watering apparatus 150 may be communicatively coupled to. The reposition data 602 may cause the watering apparatus 150 to physically move from one spot to another. The stop data 604 may cause the watering apparatus 150 to stop directing the water 402 to a plant 504. The trigger data 600 may cause the watering apparatus 150 to start directing the water 402 to a plant 504. Alternatively, the watering apparatus 150 may send the relative humidity data 612, the temperature data 610, the rainfall data, and/or a visual data back to the mobile device 304 of the user 308. The watering apparatus 150 may send this data via a radio wave. The communications circuitry 202 of the watering apparatus 150 would send a signal to the access point 312. The access point 312 would send the signal to a cell tower 310 nearby the user 308 of the mobile device 304 via the Internet 306. The touchscreen 314 of the mobile device 304 may display the relative humidity data 612, the temperature data 610, and/or the rainfall data. The touchscreen 314 may also display the visual data, in the central view 606, captured by the weather resistant camera 106.

In an alternate embodiment, as illustrated in FIG. 7, an irrigation system 550 consists of non-moveable weather resistant housing 100. A weather resistant housing 100 may be affixed in a nearby location of the garden 500. The weather resistant housing 100 may still house, the microprocessor 200, the communications circuitry 202, the rainfall sensor 208, the humidity sensor 204, the temperature sensor 206, the partitioned channel 400, and/or the pressure regulated valve 404. It is important to note, that in this embodiment the weather resistant housing 100 may not be able to change location with a command communicated through a mobile device 304. The weather resistant camera 106 may be communicatively connected to the microprocessor 200. The weather resistant camera 106 may be mounted on a vantage point to view the whole garden 500 from one central view 606. The pressure regulated valve 404 may be coupled to a flexible extension 104. The mobile device 304 may receive a humidity data, a rainfall data, a temperature data 610, and/or a visual data. The irrigation system 550 may send the data via a radio wave. The communications circuitry 202 of the irrigation system 550 may send a signal to the access point 312. The access point 312 may then send the signal to a cell tower 310 nearby the user 308 of the mobile device 304 via the Internet 306. The touchscreen 314 of the mobile device 304 may display the relative humidity data 612, the temperature data 610, and/or the rainfall data. The mobile device 304 may be able to send the irrigation system a stop data and/or trigger data by a mobile device via a signal through a network. The data may

be communicated via radio waves, by sending a data signal from the mobile device **304** to the cell tower **310**. The cell tower **310** may then relay the signal via the Internet **306** to an access point **312** of the LAN **300**, of which the irrigation system **550** may be communicatively coupled to. The stop data **604** may cause the watering apparatus **150** to stop directing the water **402** to a plant **504**. The trigger data **600** may cause the watering apparatus **150** to start directing the water **402** to a plant **504**.

In an alternate embodiment, a method for irrigation is described, as shown in FIG. **8**. In operation **800**, a weather resistant camera that is wirelessly coupled with a remotely located mobile device may be repositioned based on a haptic gesture applied on a touchscreen of the mobile device. In operation **802**, a water pressure of a channel partitioned between an input connector and a flexible extension of a watering tube may be adjusted based on a haptic gesture applied on the remotely located mobile device. In operation **804**, a water may be directed to a plant of a garden in a central view of the weather resistant camera based on a command communicated from the mobile device to a microprocessor communicatively coupled with the weather resistant camera and to the watering tube through the network. In operation **806**, the microprocessor may be accessed through the mobile device based on an access control policy configured by a user of an irrigation system associated with the microprocessor. Then, the path may split. In operations **808**, **810**, **812**, an amount of rainfall **614** may be detected by a rainfall sensor, a relative humidity **612** may be analyzed, and a watering amount may be recommended. Separately, in operations **814**, **816**, and **818**, a visual data may be communicated to the watering apparatus, and water may be activated at a communicated pressure, and later water may be deactivated after use.

The user **308** may apply a haptic gesture to the touchscreen **314** of the mobile device **304**. For example, a reposition data may be communicated to the weather resistant camera **106**, and/or a message may be communicated such that a water pressure is adjusted. The user **308** may communicate a message to direct the water **402** to a plant **504** in a garden **500** in the central view **606** of the weather resistant camera **106**. The user **308** may send a signal through the mobile device **304** through the Internet **306** using a near by cell tower **310**. The Internet **306** may then send the signal to a LAN **300** that the communications circuitry **202** of the irrigation system **550** may be communicatively coupled to. Alternatively, the irrigation system **550** may send a signal to the mobile device **304** through the Internet **306** by using the communications circuitry communicatively coupled to the access point the LAN **300**. The Internet **306** may then send the signal to the mobile device **304** through a cell tower **310**. The mobile device **304** may determine an amount of rainfall **614**, as determined by the rainfall sensor **208**. The mobile device **304** may also determine a relative humidity **612** using the humidity sensor **204**, in the irrigation system **550**. The mobile device **304** may also suggest the water **402** amount. The mobile device **304** may do this by using information from the temperature sensor **206** in the irrigation system **550**. The weather resistant camera **106** may send a visual data in the central view **606** to the mobile device **304**, which may be displayed on the touchscreen **314**. The mobile device **304** may be able to send a trigger data to the irrigation system **550** through the network. The mobile device **304** may also be able to send a stop data to the irrigation system **550**.

Example embodiments of the watering apparatus **150** will now be described. A child, Arthi, age 7, might wish to water her garden when on vacation. Arthi may want to grow up and be a flower farmer. For this reason, Arthi may get up each day and water her garden. Arthi might miss watering her garden when her family is on vacation. Arthi and her father may build for her a 'Growinator' watering apparatus in their garage lab (a device name created by Arthi). This watering apparatus may allow Arthi to water her garden even when she is on vacation directly through her iPhone. As a result, her flower garden will continue thriving even when the family is away on vacation. In addition, Arthi may able to view her garden through the Watering Apparatus's camera to see progress. She may be able to guide the extension from the watering apparatus to an appropriate viewing location to enable safe watering of her garden directly to the roots of her garden. Arthi grows up and becomes an accomplished flower farmer and roboticist.

In another embodiment, a community group at the Portrero Hill community garden might wish to water their community garden. They may wish to take turns watering their garden. Members of the Portero Hill neighborhood may have signed up and verified their home addresses on the Nextdoor and Fatdoor social network. They may be able to collectively use the watering apparatus **150** when it is placed in a 'shared' mode in which trusted neighbors in the neighborhood users of the private neighborhood social network can share usage of the Growinator watering apparatus. A set of rules might automatically trigger reminders to neighbors when they need to water their community garden, and whose turn it is. The Growinator may automatically move itself to different parts of the community garden in the neighborhood garden so that each plant can be appropriately watered. As a result, the community garden may thrive.

The methods, systems, and apparatuses disclosed herein may be implemented in any means for achieving various embodiments, and may be executed in a form of a machine-readable medium embodying a set of instructions that, when executed by a machine, cause the machine to perform any of the operations disclosed herein. Although the present embodiments have been described with reference to specific example embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the various embodiments.

For example, the various devices, modules, analyzers, generators, etc. described herein may be enabled and operated using hardware circuitry (e.g., CMOS based logic circuitry), firmware, software and/or any combination of hardware, firmware, and/or software (e.g., embodied in a machine readable medium). For example, the various electrical structure and methods may be embodied using transistors, logic gates, and/or electrical circuits (e.g., Application Specific Integrated Circuitry (ASIC), Digital Signal Processor (DSP) circuitry, etc.). For example modules of each of the Figures may be enabled using electronic circuits using one or more of the technologies described herein.

In addition, it will be appreciated that the various operations, processes, and methods disclosed herein may be embodied in a machine-readable medium and or a machine accessible medium compatible with a data processing system (e.g., a computer system), and may be performed in any order. Accordingly, the specification and drawings are to be regarded in an illustrative rather than a restrictive sense.

What is claimed is:

1. A watering apparatus, comprising:

a weather-resistant housing encompassing a micro-processor, a communications circuitry;

a weather-resistant camera communicatively coupled with the weather resistant housing through the communications circuitry;

an input connector to direct water through a channel partitioned from the weather resistant housing responsive to a signal from the microprocessor through a pressure regulated valve;

a flexible extension coupled with the weather-resistant housing to automatically transport the water directed through the channel partitioned to a desired location within a central view of a focused angle of the weather-resistant camera, and

a solar panel affixed on an upper surface of the watering apparatus to a power circuitry in the weather-resistant housing,

wherein a privacy server communicatively coupled with the watering apparatus through a network to apply an address verification algorithm associated with each user of an online community formed using the privacy server to verify that each user lives at a residence associated with a claimable residential address of the online community formed through a social community module of the privacy server using a processor and a memory of the privacy server,

wherein the privacy server to generate a latitudinal data and a longitudinal data associated with each claimable residential address of the online community associated with each user of the online community,

wherein the privacy server to automatically determine a set of access privileges in the online community associated with each user of the online community by constraining access in the online community based on a neighborhood boundary determined using a Bezier curve algorithm of the privacy server,

wherein the watering apparatus to be constrained in accessibility only to those neighbors that are verified to live in the neighborhood boundary in which the watering apparatus is located,

wherein the watering apparatus to function as a community resource in the online community such that neighbors verified as living inside the neighborhood boundaries and which are part of a gardening club of the online community can collectively take turns using the watering apparatus to water a community garden of the online community, and

wherein the watering apparatus wirelessly registers a public and private Internet Protocol (IP) address with a local access point of the network through the communications circuitry.

2. The watering apparatus of claim **1** wherein the watering apparatus is accessed through a mobile device through the network based on an access control policy configured by a user of the watering apparatus.

3. The watering apparatus of claim **2** wherein the watering apparatus communicates a visual data of the weather-resistant camera including the focused angle and the central view to the mobile device through the network, and wherein the weather-resistant camera repositions based on a reposition data received from the mobile device through the network when a haptic gesture is applied on a touchscreen of the mobile device.

4. The watering apparatus of claim **3**:

wherein the watering apparatus to activate the water at a communicated pressure through the channel partitioned using the pressure regulated valve based on a trigger data received from the mobile device through the network, and

wherein the watering apparatus to deactivate the water through the channel partitioned using the pressure regulated valve based on a stop data received from the mobile device through the network.

5. The watering apparatus of claim **1** further comprising:

a rainfall sensor in the weather-resistant housing of the watering apparatus to communicate an amount of rainfall detected by the watering apparatus to the mobile device through the network;

a humidity sensor in the weather-resistant housing of the watering apparatus to communicate a relative humidity detected by the watering apparatus to the mobile device through the network; and

a temperature sensor in the weather-resistant housing of the watering apparatus to communicate a temperature data to the mobile device through the network.

6. An irrigation system, comprising:

a weather-resistant housing encompassing a micro-processor, a communications circuitry;

a weather-resistant camera communicatively coupled with the weather resistant housing through the communications circuitry;

a mobile device to reposition the weather-resistant camera and to direct water to a plant of a garden in a central view of the weather-resistant camera based on commands communicated from the mobile device to the microprocessor through a network;

an input connector to direct the water through a channel partitioned from the weather resistant housing responsive to a signal from the microprocessor through a pressure regulated valve; and

a flexible extension coupled with the weather-resistant housing to automatically transport the water directed through the channel partitioned to a desired location within the central view of a focused angle of the weather-resistant camera,

wherein a watering apparatus wirelessly registers a public and private Internet Protocol (IP) address with a local access point of the network through the communications circuitry,

wherein the watering apparatus is accessed through the mobile device through the network based on an access control policy configured by a user of the watering apparatus,

wherein the watering apparatus communicates a visual data of the weather-resistant camera including the focused angle and the central view to mobile device through the network, and wherein the weather-resistant camera repositions based on a reposition data received from the mobile device through the network when a haptic gesture is applied on a touchscreen of the mobile device,

wherein the watering apparatus to activate the water at a communicated pressure through the channel partitioned using the pressure regulated valve based on a trigger data received from the mobile device through the network,

wherein the watering apparatus to deactivate the water through the channel partitioned using the pressure regulated valve based on a stop data received from the mobile device through the network,

wherein a privacy server communicatively coupled with the watering apparatus through a network of the irrigation system to apply an address verification algorithm associated with each user of an online community formed using the privacy server to verify that each user lives at a residence associated with a

claimable residential address of the online community formed through a social community module of the privacy server using a processor and a memory of the privacy server,

wherein the privacy server to generate a latitudinal data and a longitudinal data associated with each claimable residential address of the online community associated with each user of the online community,

wherein the privacy server to automatically determine a set of access privileges in the online community associated with each user of the online community by constraining access in the online community based on a neighborhood boundary determined using a Bezier curve algorithm of the privacy server,

wherein the watering apparatus to be constrained in accessibility only to those neighbors that are verified to live in the neighborhood boundary in which the watering apparatus is located, and

wherein the watering apparatus to function as a community resource in the online community such that neighbors verified as living inside the neighborhood boundaries and which are part of a gardening club of the online community can collectively take turns using the watering apparatus to water a community garden of the online community.

7. The irrigation system of claim **6** further comprising:

a rainfall sensor associated with the weather-resistant housing of the watering apparatus to communicate an amount of rainfall detected by the watering apparatus to the mobile device through the network;

a humidity sensor associated with the weather-resistant housing of the watering apparatus to communicate a relative humidity detected by the watering apparatus to the mobile device through the network; and

a temperature sensor associated with the weather-resistant housing of the watering apparatus to communicate a temperature data to the mobile device through the network.

8. The irrigation system of claim **6** further comprising:

a solar panel affixed on an upper surface of the watering apparatus to a power circuitry in the weather-resistant housing.

9. An irrigation method, comprising:

repositioning a weather-resistant camera wirelessly coupled with a remotely located mobile device based on a haptic gesture applied on a touchscreen of the mobile device;

adjusting a water pressure of a channel partitioned between an input connector and a flexible extension of a watering tube based on the haptic gesture applied on the remotely located mobile device;

directing water to a plant of a garden in a central view of the weather-resistant camera based on a command communicated from the mobile device to a microprocessor communicatively coupled with the weather-resistant camera and to the watering tube through a network;

determining an amount of rainfall detected by a rainfall sensor in an irrigation system on the mobile device through the network;

analyzing a relative humidity detected by a humidity sensor in the irrigation system using the mobile device through the network;

accessing the microprocessor through the mobile device through the network based on an access control policy configured by a user of the irrigation system associated with the microprocessor; and

suggesting a recommended water amount on the mobile device based on a temperature data detected by a temperature sensor in the irrigation system through an optimum garden algorithm applied through the mobile device,

wherein the microprocessor and the weather-resistant camera is powered through a solar panel affixed to the weather resistant camera,

wherein the microprocessor, the rainfall sensor, the humidity sensor, and the temperature sensor are embedded in a weather-resistant housing of the weather-resistant camera,

wherein a privacy server communicatively coupled with a watering apparatus through the network to apply an address verification algorithm associated with each user of an online community formed using the privacy server to verify that each user lives at a residence associated with a claimable residential address of the online community formed through a social community module of the privacy server using a processor and a memory,

wherein the privacy server to generate a latitudinal data and a longitudinal data associated with each claimable residential address of the online community associated with each user of the online community,

wherein the privacy server to automatically determine a set of access privileges in the online community associated with each user of the online community by constraining access in the online community based on a neighborhood boundary determined using a Bezier curve algorithm of the privacy server,

wherein the watering apparatus to be constrained in accessibility only to those neighbors that are verified to live in a neighborhood boundary in which the watering apparatus is located, and

wherein the watering apparatus to function as a community resource in the online community such that neighbors verified as living inside the neighborhood boundaries and which are part of a gardening club of the online community can collectively take turns using the watering apparatus to water a community garden of the online community.

10. The irrigation method of claim **9** wherein the microprocessor communicates a visual data of the weather-resistant camera including a focused angle and the central view to the mobile device through the network.

11. The irrigation method of claim **10**:

wherein the microprocessor to activate the water at a communicated pressure through the channel partitioned using a pressure regulated valve based on a trigger data received from the mobile device through the network, and

wherein the microprocessor to deactivate the water through the channel partitioned using the pressure regulated valve based on a stop data received from the mobile device through the network.

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